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ABSTRACT

The Beginning Teacher Evaluation Study, Phase II, was a research project on effective teaching behavior--what teachers do that significantly affects what and how pupils learn. The purposes of Phase II were to (1) develop an assessment system for measuring teacher and student behaviors and other factors which could influence each of them and their interrelationships and (2) generate hypotheses about the interrelationships among teacher and pupil behaviors and related factors. Subjects were 41 second grade and 54 fifth grade experienced teachers in eight school districts in California. Pupils' reading and mathematics skills were measured. Reading scores were for decoding, comprehension, and applications; mathematics scores were for computation, concepts, and applications. Students' attitudes, aptitudes, cognitive style and expectations were also measured. The teachers were tested on a variety of knowledge and aptitude factors including cognitive style. Path analyses and multiple and stepwise regression of residual and mean gain scores on teaching performance were performed. Results indicate a significant and consistent effect of teaching performances on student learning. (RC)

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A Report on the Results of Phase II of the Beginning Teacher Evaluation Study: The Effects of Teaching Performances on Student Learning

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the American Educational Research Association
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1. Data cited in this paper were selected from data gathered in Phase II of the Beginnirg Teacher Evaluation Study. This phase of the research was done by Educational Testing Serfice for the California Commission for Teacher Preparation and Licensing and was funded by the National Institute of Education.

Introduction

The major purpose of Phase II of the Beginning Teacher Evaluation Study was to find relations between teaching performances and achievement in reading and mathematics. The study also assessed the relative influence of the antecedents of teaching performances and of learning. Such antecedents of teaching performances as the teachers' knowledge of what was to be taught and of methodological principles and strategies for teaching it, the teachers' attitudes, aptitudes and backgrounds, and the characteristics of the teaching environment were measured to assess their influence on teaching performance. Characteristics of pupils such as their background, aptitudes, attitudes and expectations were measured to assess their influence on learning. Three questions may be answered tentatively by analyzing the data gathered:

1. What is the relative influence of teaching performance on learning compared to that of the pupils' previous learning, aptitudes, attitudes, and expectations?

2. How do teaching performances vary as a function of teachers' background, knowledge, aptitude, and attitudes?

3. Which teaching performances are significantly related to differences in pupils' achievement in reading and mathematics?

This paper presents a partial answer to the last question, partial because only some of the data can be presented here. A fuller report on the answer to this question may be found in the Final Report of Phase II and in its summaries.[1]

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1. Copies of these documents may be obtained from Educational Testing Service, Princeton, N.J. 08540. Ask for Final Report, Phase II, Beginning Teacher Evaluation Study.

Methodology

The Phase II study was a multivariate analysis of teaching performances and learning. The central feature of the design was a fall and spring assessment of pupil learning and observations of teaching performance during the intervening period. Other teacher and pupil variables were also measured in the fall and spring and during the year.

The basic analytic methodology was to regress pupil spring scores on fall scores and then to find the correlates of these residual scores. Pupils' reading and mathematics skills were measured. Reading scores were for decoding, comprehension and applications; mathematics scores were for computation, concepts and applications. In this paper, teaching performances are related only to total reading and mathematics scores.

Ninety-five teachers in 43 schools in eight school districts and their pupils participated in this study. They taught reading or mathematics at the second and fifth grade. All data were organized by teacher, and each analysis has been made with the data for pupils who had both spring and fall scores.

Each participating teacher was observed on at least two occasions. Two different observational systems were used, one a behavioral recording system (APPLE), the other, a categorical system (RAMOS). The teachers also described on two occasions the content and goals of their instruction in reading and mathematics and their teaching strategies (Work Diary).[2]

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2. Reports on these systems are part of the session in which this paper was presented. See papers by N. Lambert, R. Calfee and P. Elias.

Each of these methods for obtaining data on teaching performance was reduced to a large number of variables. These sets were further reduced to the set presented in Table 1. The original categories were formed into groups by collecting different measures of the same phenomena. Consider Work Diary 1, for example. This category represents all of the original measures of time spent preparing for and conducting instruction. Each of its components was weighted in terms of its correlations with other components in that category. The correlation matrix of the components was used as a multiplicand in the equation

$$xR = y$$

where x is the teacher's score on the component, R is the correlation matrix of the components, and y is the transformed score used to represent the teacher's score in the superordinate category. These procedures were necessary to reduce the number of teaching performance variables so that there were fewer performance variables than teachers, and to reduce the multicollinearity among the variables in the original data set.

Two kinds of scores were used, residual scores and mean change scores. Analyses were performed by single variables within observation systems, by sets of variables by observation system, and by total set. Both multiple and stepwise regressions were performed. In the data presented here, only the total reading or mathematics score was used. This score is the most reliable indicator of pupil performance.

Results

Tables 8.16 and 8.22 present the results of the stepwise regressions for second-grade reading. Table 8.16 is the results of the regression

analysis using residual scores, Table 8.22 is the results of the analysis using mean change scores. Tables 8.19 and 8.24 are similar tables for total mathematics scores. Tables 8.32, 8.42, 8.38 and 8.45 present the results of comparable analyses for fifth-grade reading and mathematics.

The results of the stepwise regressions are presented because they probably describe patterns of performance more clearly than the other analyses. Variables were entered in this analysis in terms of their contribution to $R.^2$ Tables 8.25 and 8.46 summarize the results of all of the different kinds of analyses.

Second-Grade Reading (See Tables 8.16 and 8.22)

Consider the information in Table 8.16. Initial or fall score accounts for most of the variance in spring scores. Three teaching performance variables account for 35 percent of the remaining variance. Thus initial score plus this pattern of teaching performances account for almost all of the variance in spring scores.

Two of these variables, WD-4 and R-2, are negative predictors. The positive predictor, R-3, is a proxy for direct individual instruction. WD-4 is a proxy for the single teacher classroom.

A reasonable conclusion is that one teacher carrying most of the instruction and trying to do many things is an ineffective combination. In contrast, direct individual instruction is an effective strategy.[3]

When mean-change scores are used in the analysis, WD-4 again appears as a negative predictor. Ap-7, teaching the class-as-a-whole is a positive predictor. Note that these two variables account for a relatively small portion of variance in the mean-change scores.

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3. Other data in this study makes this conclusion even clearer.

AP-7 represents a technique for providing some direct instruction for all pupils. The significance of this variable is that it is an alternate to independent seatwork in which children spend on-the-average 50 percent of the instructional time.

Second-Grade Mathematics (See Tables 8.19 and 8.24)

When total mathematics residual scores are used in the analysis, again we find that initial scores account for most of the variance in spring scores, but six teaching performance variables account for 45 percent of the remaining variance. Five of these variables are negative predictors.

The one positive predictor is the amount of content covered. The more mathematics taught, the more is learned, other things being equal presumably.

The pattern of ineffective performances is one in which the teacher carries most of the instruction by teaching the class-as-a-whole, probably by standing at the frong of the class, explaining and questioning.

Teaching performance variables account for 63 percent of the variance in mean-change scores. Fifteen performance variables produce this result, of which ten are negative predictors. Included in these negative predictors are the same ones found to be negative in the analysis of residual scores.

The positive predictors include direct instruction by the teacher to individual pupils (R-1), and a social control performance (Ap-13). Two pupil behavior variables, Ap-2 and Ap-3, measures of on-task and productive behavior are also positive predictors.

Fifth-Grade Reading (see Tables 8.32 and 8.42)

When residual scores are used in the analysis of fifth-grade total reading scores, teaching performance variables account for 31 percent of the variance in spring scores after fall scores are partialled out. Four variables are negative predictors and three are positive. Two of these negative predictors are similar, the use of a variety of instructional materials. We think that when this variable appears as a negative predictor, it is a proxy for disorganized instruction.

One positive predictor, R-4, is independent reading; the other, Ap-10, is discussing, explaining, and questioning. Since the emphasis in fifth-grade reading is usually on reading comprehension, an effective strategy for developing comprehension seems to be independent reading during which the teacher discusses the reading materials with the pupils.

When mean-change scores are used, two performance variables account for ten percent of the variance in mean-change scores. One of these, Ap-8, is a measure of the amount of time the teacher spends organizing instruction in contrast to instructing. Recall that I suggested when discussing the analysis of residual scores, that a variety of materials was a proxy for disorganized instruction.

Ap-10, discussing, explaining and questioning is again a positive predictor. Its appearance as a positive predictor suggests that this performance is critical in developing skill in reading at the fifth-grade.

Fifth-Grade Mathematics (See Tables 8.38 and 8.45)

In the analysis of fifth-grade total mathematics scores using residual scores, teaching performance variables account for 50 percent of the variance in spring scores after fall scores are partialled out.

Four variables are negative predictors, of which three are pupil behavior variables. Among the positive predictors, two are ways of organizing instruction, Ap-6, teaching in groups, and Ap-7, teaching the class-as-a-whole. The third is an interaction strategy, Ap-10, discussing, explaining and questioning.

When mean-change scores are used, teaching performance variables account for 62 percent of the variance. The positive predictors are the amount of content covered (R-2), keeping pupils on task (Ap-13), teaching the class-as-a-whole (Ap-7) and teaching in groups (Ap-6), and discussing, explaining and questioning (Ap-10).

The negative predictors are unproductive and off-task behavior, and using independent seatwork. Direct instruction by the teacher seems to be more necessary than practicing mathematical operations.

Summary

Three major conclusions seem supported by these data:

1. Teaching performances accounted for a third to a half of the variance in pupil spring scores when their fall scores were partialled out.

2. Teaching performances account for about half of the variance in mean-change scores.

3. Patterns of effective and ineffective performance appeared in both subjects and at both grade levels.

4. These patterns differ by subject and grade level.

5. At the second-grade direct individual instruction is the core of an effective strategy.

6. At the fifth-grade direct instruction and interacting with pupils in ways which stimulate comprehension responses are the core of an effective strategy.

These differences in effective performances are probably related to the differences in what is to be learned at the two grades. At second-grade discrete responses are being acquired and linked together. Therefore, continuous instruction for individuals and monitoring of the acquisition process are probably needed. At the fifth-grade cognitive processes to be used with varied content are being learned. Teaching strategies which stimulate comprehension processes are probably required.

A REPORT ON THE RESULTS OF PHASE II OF THE BEGINNING TEACHER EVALUATION STUDY: THE EFFECTS OF TEACHING PERFORMANCES ON STUDENT LEARNING

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Table Number	Description
1	Description of Teacher Performance Variables
8.16	Stepwide Regression of Residual Scores on Teacher Performance Variables Grade 2--Reading
8.22	Stepwise Regression of Mean Gain scores on Teacher Performance Variables Grade 2--Reading
8.19	Stepwise Regression of Residual Scores on Teacher Performance Variables Grade 2--Mathematics
8.24	Stepwise Regression of Mean Gain Scores on Teacher Performance Variables Grade 2--Mathematics
8.25	Summary of Significant Grade 2 Teacher Performance Variables Listed by Type of Analysis
8.32	Stepwise Regression of Residual scores on Teacher Performance Variables Grade 5--Reading
8.42	Stepwise Regression of Mean Gain Scores on Teacher Performance Variables Grade 5--Reading
8.38	Stepwise Regression of Residual Scores on Teacher Performance Variables Grade 5--Mathematics

Table Number	Description
8.45	Stepwise Regression of Mean Gain Scores on Teacher Performance Variables Grade 5--Mathematics
8.46	Summary of Significant Grade 5 Teacher Performance Variables Listed by Type of Analysis

Data cited in this paper were selected from the data gathered in Phase II of the Beginning Teacher Evaluation Study conducted by Educational Testing Service for the California Commission for Teacher Preparation and Licensing and funded by the National Institute of Education.

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